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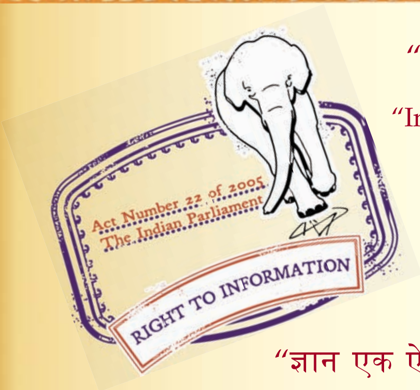


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IS : 4545 ( Part 5 ) - 1983
( Reaffirmed 2003 )

*Indian Standard*

# METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

## PART 5 SENSITIVITY

*( First Revision )*

UDC 621·397·62 : 621·317·34



INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 6 *July* 1986

# *Indian Standard*

# METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

## PART 5 SENSITIVITY

## *( First Revision )*

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*Indian Standard*

# METHODS OF MEASUREMENT ON RECEIVERS FOR TELEVISION BROADCAST TRANSMISSIONS

## PART 5 SENSITIVITY

## *( First Revision )*

## 0. FOREWORD

**0.1** This Indian Standard (Part 5) (First Revision) was adopted by the Indian Standards Institution on 6 December 1983, after the draft finalized by the Radio Communications Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

**0.2** The first version of IS : 4545 covered the methods of measurement for television broadcast receivers having only monochrome vision reception. With the introduction of colour television receivers, this standard is now being revised to make it applicable to receivers designed for both monochrome and colour vision reception and published in a number of parts to deal with different characteristics of television receivers.

**0.3** This standard ( Part 5 ) covers methods of measurements for sensitivity of television receivers. Other parts in this series are:

Part 1 General considerations
Part 2 Tuning properties and general measurements
Part 3 Geometrical properties of the picture
Part 4 Synchronizing quality
Part 6 Selectivity and response to undesired signals
Part 7 Fidelity
Part 8 Compatibility with audio visual recording equipment
Part 9 Electrical and acoustic measurements at audio frequency

**0.4** This standard ( Part 5 ) is largely based on IEC Publication 107 - 1 ( 1977 ) Recommended methods of measurement on receivers for television broadcast transmissions: Part 1 General considerations electrical measurements other than those at audio-frequencies, issued by the International Electrotechnical Commission.

**0.5** In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is it to be rounded off, it shall be done in accordance with IS : 2-1960*.

*Rules for rounding off numerical value ( *revised* ).

## 1. SCOPE

**1.1** This standard ( Part 5 ) covers methods of measurement for parameters relating to sensitivity of television receivers, namely :

a) Gain limited sensitivity;
b) Noise limited sensitivity;
c) Synchronizing sensitivity;
d) Colour sensitivity;
e) Co-efficient of reflection;
f) Automatic gain control characteristics, static and dynamic;
g) Chrominance automatic gain control characteristics;
h) Colour killing and colour killer response time; and
j) Maximum usable input signal level, single and multiple.

**1.2** This standard ( Part 5 ) shall be read in conjunction with IS : 4545 ( Part 1 ) - 1983*.

## 2. GENERAL CONSIDERATIONS

**2.1** Measurements are carried out, unless otherwise stated, using the standard image and the standard video output voltage. Where performance is not measured on all channels in which the receiver is designed to operate, it shall be carried out on a representative number of channels. When an overall figure for the receiver sensitivity is required, it shall be corresponding to the channel having the lowest sensitivity and that channel shall be identified in the results.

*Methods of measurement on receivers for television broadcast transmissions : Part 1 General considerations ( *first revision* ).

## 3. STANDARD IMAGE AND STANDARD VIDEO OUTPUT VOLTAGE

**3.1 Definition** — A standard image is defined as a display in which those parts of the picture corresponding to white level have a luminance of 80 $cd/m^2$, and those parts corresponding to black level have a luminance of 2 $cd/m^2$ both in the absence of ambient illumination. Other levels of luminance may be used if the receiver has special characteristics or if the manufacturer's information infers that different values from those recommended should be used. In these cases, the levels of luminance used and why they were used shall be stated with the results. The standard image shall take the form of a test pattern in which the mean level of the picture modulation is close to 50 percent.

The pattern shall include an area at white level sufficiently large for luminance measurements to be carried out conveniently and distinguished through interfering noise. The corresponding voltage excursion between black level and white level at the appropriate electrodes of the picture tube is the standard video output voltage.

**3.2 Method of Measurement** — The standard video output voltage is measured at the appropriate picture tube electrodes by means of an oscilloscope. Where a colour display tube uses different drive levels for the various guns, the greatest of them is considered to be standard video output voltage; the receiver grey scale tracking having been first correctly adjusted to correspond with the white point.

Care shall be taken that any beam current limiting device does not influence results when defining the standard video output voltage. Alternatively, where appropriate, that beam current limiting shall be so adjusted that it is not operative at the standard video output voltage.

## 4. GAIN LIMITED SENSITIVITY

**4.1 Definition** — The gain limited sensitivity of the receiver is the lowest value of the available power from a signal source required to obtain the standard image when the gain controls are set for maximum amplification.

**4.2 Method of Measurement** — The input signal shall be television signal with test pattern picture content consistent with the standard image and with components giving 100 percent picture modulation.

The input signal is applied to the input terminals of the receiver as described in 8 of IS : 4545 (Part 1 ) - 1983*. The carrier frequency of the signal generator is adjusted to the carrier frequency of the television channel selected. The receiver is tuned in accordance with 3 of IS : 4545 ( Part 2 ) - 1983*. The controls of the receiver shall be adjusted for maximum sensitivity.

The input signal level is then adjusted until the standard video output voltage is obtained, this level being the input level corresponding to the gain-limited sensitivity of the receiver. Measurements shall be carried out using a representative number of channels in each of the bands for which the receiver is designed.

## 5. NOISE LIMITED SENSITIVITY

**5.1 Definition** — The $\frac{\text{p-p signal}}{\text{rms noise}}$ ratio is the ratio between the peak-to-peak black level to white level voltage swing at the appropriate picture tube electrodes corresponding to the standard image and the rms noise voltage at the same picture tube electrodes which occurs at 50 percent picture modulation. At the value of the input signal level that provides the standard video output voltage, this ratio may attain a value which is considered unacceptable. This value is not the same for all receivers. In cases, however, when it is considered practical to define a certain value for this ratio which limits the acceptability of the receiver performance, the available power input for which this value is obtained is called the noise-limited sensitivity. The value may be marked on the $\frac{\text{p-p signal}}{\text{rms noise}}$ ratio curve.

**5.2 Method of Measurement** — Radio-frequency input signal containing monochrome picture modulation at levels, 0 percent, 50 percent and 100 percent, either simultaneously in the pattern ( *see* Fig. 1A ) or by adjustment of the pattern generator and with a switchable colour synchronizing signal, is applied to the input terminals of the receiver. Two sets of measurements are made, one with the colour synchronizing signal included so that the colour decoding circuit are operative and the other with the colour synchronizing signal removed.

The receiver is always set for standard video output voltage. The level of the input signal is varied in steps and at every step, the rms noise voltage is measured with an oscilloscope. Since the rms noise voltage cannot be determined exactly by this method, it is recommended that the ratio between the excursions observed on the oscilloscope screen and the rms noise voltage be established before the measurement is carried out. To do this, a noise signal of known rms value and having a bandwidth approximately equal to the noise bandwidth of the receiver is applied to the oscilloscope. The bandwidth of

*Methods of measurement on receivers for television broadcast transmissions : Part 1 General considerations ( *first revision* ).

*Methods of measurement on receivers for television broadcast transmissions: Part 2 Tuning properties and general measurements ( *first revision* ).

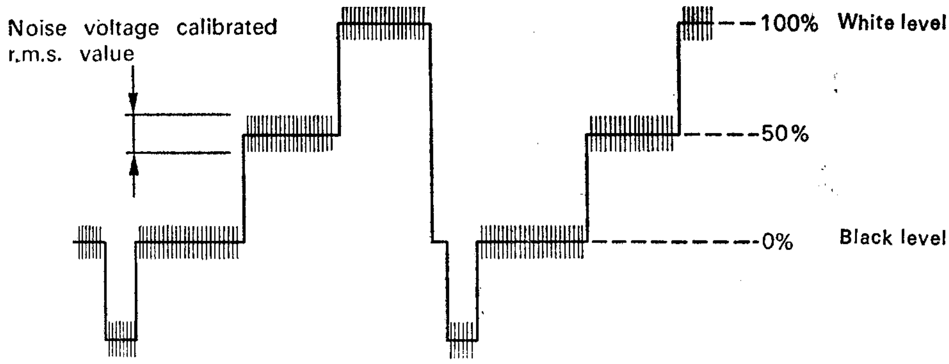



FIG. 1A MODULATION WAVEFORM FOR SIGNAL TO NOISE RATIO MEASUREMENT

the oscilloscope shall be greater than the bandwidth of the receiver.

NOTE 1 — As an aid to assessing the rms noise voltage on the oscilloscope screen, the signal from the receiver may be applied to both channels of a dual trace oscilloscope. The traces are then shifted together until the two halos due to the noise just meet. A noise signal may then be applied alone to the two oscilloscope inputs, care being taken that the traces are not shifted, and the noise signal level adjusted again until the two halos just meet. The value of noise signal may be read from the calibrated signal generator output. The $\frac{\text{p-p signal}}{\text{rms nois}}$ ratio is obtained as a function of the available power and a curve plotted as shown in Fig. 1B. The impairment caused by a given rms noise voltage is influenced by various characteristics of the receiver. This shall be kept in mind when comparing different receivers.

NOTE 2 — For monochrome receivers, only the second set of measurements shall be made.

NOTE 3 — This measurement may alternatively be carried out using a suitable video noise measuring insturment.

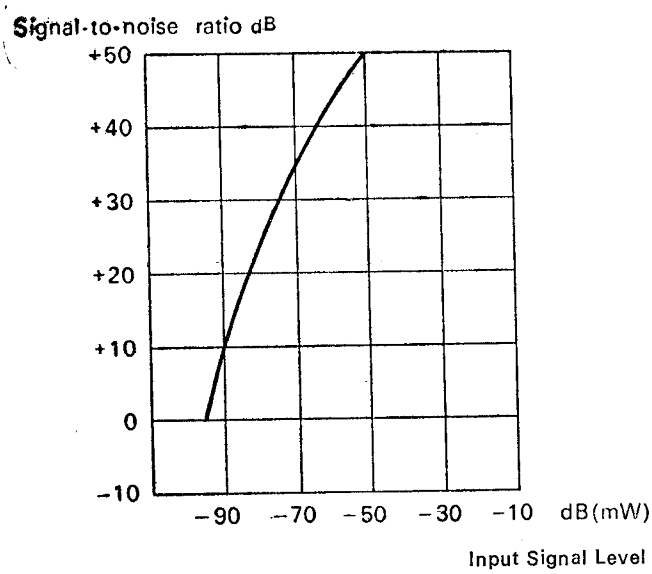



FIG. 1B EXAMPLE OF SIGNAL-TO-NOISE RATIO CURVE

## 6. SYNCHRONIZING SENSITIVITY

**6.1 Definition** — The synchronizing sensitivity is the level of the input signal applied to the receiver for which synchronization is completely or partly lost, causing the picture quality to become unacceptable.

**6.2 Method of Measurement** — The receiver is set up for a standard image with a television signal modulated by a test pattern applied to the input terminals.

Subsequently, the input signal level is reduced in steps completely interrupting the signal on each occasion. The user controls are adjusted for optimum performance at each level. The level at which the picture becomes unacceptable due to loss of synchronization shall be noted, this input level being the synchronizing sensitivity. The manner in which the synchronization is lost shall also be noted. In some cases, the picture may be unacceptable due to noise or lack of contrast rather than loss of synchronization, in which case the syncronizing sensitivity cannot be defined.

## 7. COLOUR SENSITIVITY ( NOT APPLICABLE TO MONOCHROME TV RECEIVERS )

**7.1 Definition** — The colour sensitivity is the level of input signal applied to a colour receiver at which the colour decoding circuits cease to operate, causing colour values to become unacceptable or causing the receiver to revert to monochrome operation.

**7.2 Method of Measurement** — The receiver is set up for a standard image with a television signal modulated by a test pattern applied to the input. Subsequently, the input signal is reduced in steps, and at each input level the receiver controls are set for optimum performance. The

level at which the picture colour quality becomes unacceptable for at which the receiver reverts to monochrome operation is noted, this input signal level being the colour sensitivity. The manner in which the picture colour reproduction becomes unacceptable shall be noted.

## 8. COEFFICIENT OF REFLECTION AT THE RECEIVER INPUT

**8.1 Definition** — Reflections at the receiver input are caused by a mismatch between the impedances of the specified aerial cable and the receiver input.

If the receiver input impedance is called $Z$ and the characteristic impedance of the cable is $R$, the coefficient of reflection at the receiver input is:

$$\rho = \frac{Z - R}{Z + R}$$

The voltage standing wave ratio(s) is:

$$s = \frac{1 + |\rho|}{1 - |\rho|}$$

**8.2 Method of Measurement** — A long aerial cable of the specified characteristic impedance is connected to the aerial input terminals of the receiver, which is switched on and tuned to the appropriate channel. A signal generator is connected to the other end of the cable. The generator applies an unmodulated radio-frequency signal of constant emf and variable frequency to this end of the cable. The strength of the signal at this end is measured with a detector. The combination of the signal generator and the detector shall terminate the cable accurately with its characteristic impedance ( *see* Fig. 2A ). The strength of the signal measured by the detector instrument is plotted as a function of the input signal frequency, first with the receiver end of the cable short-circuited and secondly with the receiver end of the cable connected to the aerial input terminals of the receiver. From these two curves ( *see* Fig. 2B ) the magnitude of the coefficient of reflection $|\rho|$ is derived as a function of frequency.

The cable shall be long enough for a sufficient number of undulations to be recorded within a frequency range corresponding to the passband of the receiver. The frequency separation between adjacent minima is equal to:

$$\Delta f = \frac{v}{2l}$$

where

$v$ = velocity of propagation in the cable, and

$l$ = length of the cable.

when the far end of the cable is short-circuited.

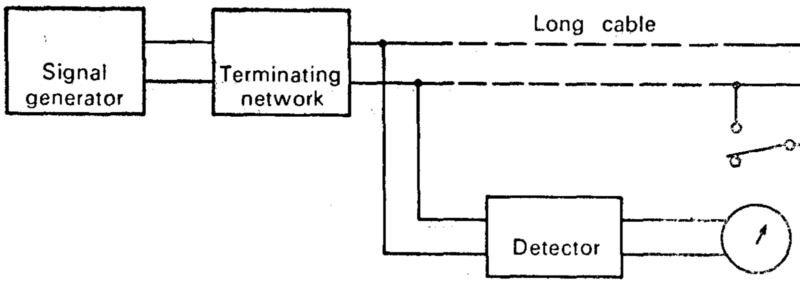
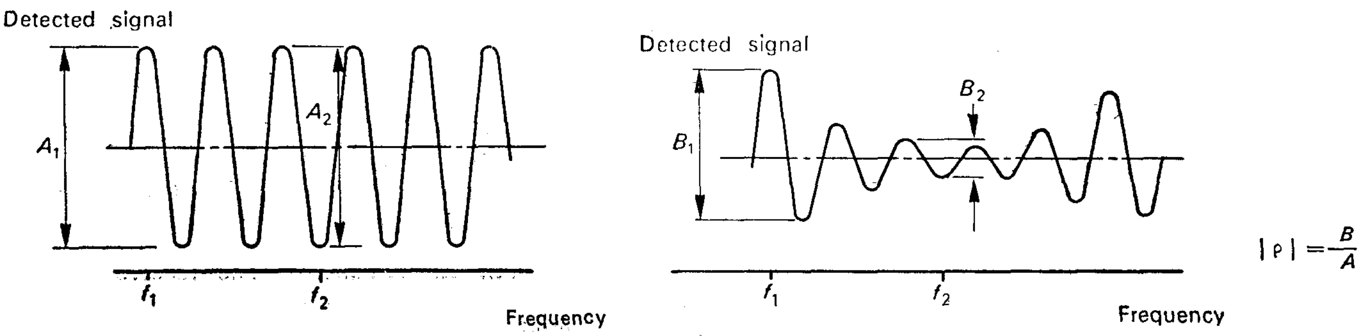



FIG. 2A CIRCUIT ARRANGEMENT FOR MEASUREMENT OF THE COEFFICIENT OF REFLECTION




Detected signal with cable short-circuited at the receiver

Detected signal with cable terminated with the receiver input terminals

FIG. 2B RESULT OF MEASUREMENT OF THE COEFFICIENT OF REFLECTION

The attenuation of the cable shall below enough for the undulations to be of sufficient amplitude when the far end of the cable is short-circuited ( *see* Fig 2B ).

The undulations may be displayed when a sweeping signal generator is used and the detected signal is made visible on an oscilloscope. The zero reference line may then be made visible by periodically blanking out the sweep-generator output.

The coefficient of reflection shall be measured in each of the channels for which the receiver has been designed.

Alternatively, any equivalent method, expressing the coefficient of reflection in terms of admittance or impedance as a function of frequency, may be used.

NOTE — This measurement may be conveniently carried out by means of reflectometer or bridge indicating the reflection coefficient directly. A normal television signal may then be used as a signal source in order that the automatic gain control of the receiver operates normally.

## 9. AUTOMATIC GAIN CONTROL STATIC CHARACTERISTICS

**9.1 Definition** — Each of the automatic gain control ( AGC ) characteristics relates the output level of sound or vision channels of a television receiver to the input level of a television signal.

**9.2 Method of Measurement** — A television signal in accordance with the standards of the television system is applied to the input terminals of the receiver through any necessary matching networks. The relative levels of the vision and the sound carriers are adjusted to the ratio specified by the appropriate standards.

The vision carrier is modulated with a monochrome test pattern video signal having parts corresponding to 100 percent modulation. The associated sounds carrier is 30 percent modulated with a suitable audio-frequency tone, for instance 1 kHz.

The sensitivity, contrast and volume controls are so adjusted that standard video output voltage is obtained for a vision input signal level of −50 dB ( mW ) and that the sound output power equals one-half of the maximum useful output power.

The output signal level is then varied ( maintaining a constant ratio between the vision and sound input signal levels ) and the output-voltage excursion between black level and white level, as well as the sound output power are measured as a function of the input signal level. The results are plotted and the input signal levels at which overloading, distortion or cross-modulation occurs, shall be noted on the graph.

The measurements shall be repeated with the receiver adjusted in the same way, for some other recommended values of input signal level.

If the receiver has a local-distant switch or a sensitivity control, measurements shall be made over a range of settings.

A check may be made to find out to what extent the vision or the sound AGC characteristics change when the sound or the vision radio-frequency signal is switched off or when their relative levels are changed. The different effects occurring with a.m. or f.m. sound system shall be borne in mind.

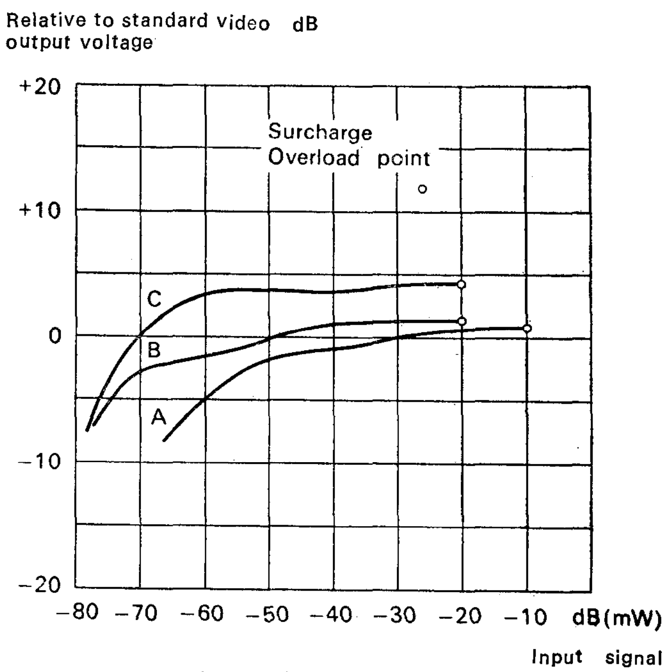
**9.3 Graphic Representation** — The results are plotted on graphs showing the relative amplitude of the picture modultion at the picture tube electrodes, or the relative level of the sound output power, respectively, as a function of the input signal level.

For the vision channel, an example of such a graph is shown in Fig. 3.

## 10. AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTICS

**10.1 Definition** — Each automatic gain control dynamic characteristic relates the output level of both sound and vision channels of a television receiver to the input level of a television signal when the input level is varying cyclically or is subject to a transient change.

**10.2 Method of Measurement** — A television signal in accordance with the standards of the television system is applied to the input terminals of the receiver through an attenuator, the attenuation of which is controllable by a low-frequency signal. Any necessary matching networks are included between the signal generator and the controllable attenuator, and between the controllable attenuator and the receiver.




Receiver set for standard video output voltage at an input level of
*A*: −30 dB (mW); *B*: −50 dB (mW); *C*: −70 dB (mW)

FIG. 3 EXAMPLE OF AUTOMATIC GAIN CONTROL STATIC CHARACTERISTIC

The relative levels of the vision and sound carriers are adjusted to the ratio specified by the appropriate standards. The picture carrier is modulated with a monochrome test pattern video signal having parts corresponding to 100 percent modulation. The corresponding sound carrier is 30 percent modulated with a suitable audio-frequency tone, for instance 1 kHz.

The sensitivity, contrast and volume controls are so adjusted that standard video output voltage is obtained for a vision input signal level of −50 dB ( mW ) and that the sound output power equals one half of the maximum useful output power.

A low-frequency sinusoidal controlling signal is applied to the terminals of the controllable attenuator such that the signal level applied to the receiver varies by ±3 dB in power. The frequency of the sinusoid is varied from a very low frequency such that the response time of the automatic gain control circuit does not influence the results, for instance 0·1 Hz, up to a frequency where the gain control circuitry does not influence the variations of video output voltage. The peak-to-peak variations of the video output voltage excursions between black level and white level, and variations of sound output power, corresponding to the variations of input signal level are measured over the defined range of frequencies. If overloading distortion or cross-modulation occur at certain frequencies, the effect shall be noted in the results and, if necessary, the range of variation of input signal level reduced, this level being shown in the results.

The measurements shall be repeated with the receiver adjusted in the same way for some other recommended values of the mean input signal level. If the receiver has a local-distant switch or a sensitivity control, measurements shall be made over a range of settings.

The measurements shall be repeated with a low-frequency squarewave controlling the attenuator and the video output voltage excursions between black level and white level, as well as the sound power, measured as a function of the time following the squarewave transition. The frequency of the squarewave should be sufficiently low for the response time of the AGC circuit to be fully displayed.

**10.3 Graphic Representation** — The results are plotted for sinusoidal variations on graphs showing the relative amplitudes of the picture modulation on the picture tube electrodes or the relative level of the sound output power as a function of frequency of variation of the input signal level. For the vision channel, an example of such a graph is shown in Fig. 4.

Results for squarewave variation of the input signal level are plotted on graphs showing relative amplitude of the picture modulation at the picture tube electrodes or the relative level of the sound output power as a function of time following the squarewave transition. For the vision channel, an example of such a graph is shown in Fig. 5.

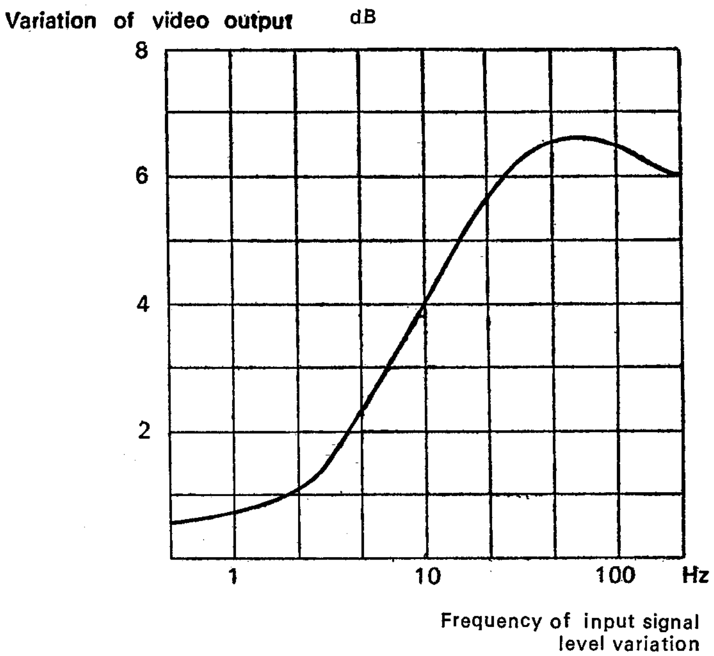



FIG. 4 EXAMPLE OF AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTIC

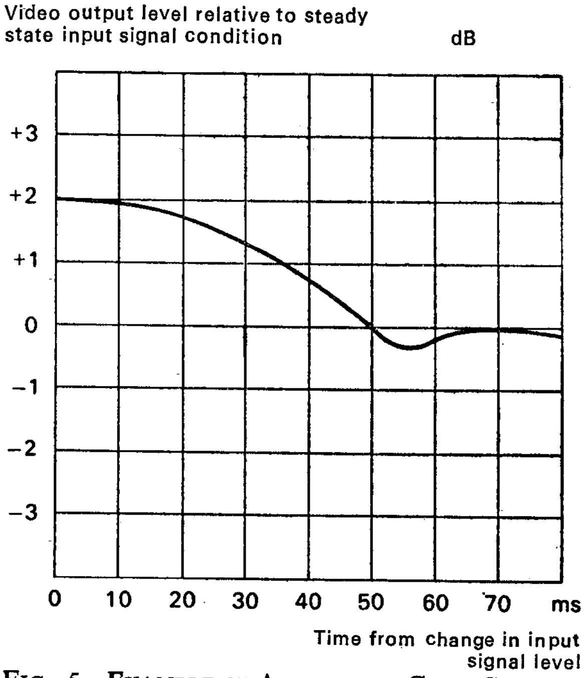



FIG. 5 EXAMPLE OF AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTIC TRANSIENT RESPONSE

## 11. CHROMINANCE AUTOMATIC GAIN CONTROL CHARACTERISTIC ( NOT APPLICABLE TO MONOCHROME TV RECEIVERS )

**11.1 Definition** — The chrominance automatic gain control characteristic relates the output

level of the chrominance component of the primary colour signals generated by the receiver decoder to the level of the chrominance carrier reference burst at the input to the decoder. This measurement principally applies to colour coding systems using amplitude modulation of the chrominance subcarrier.

**11.2 Method of Measurement** — A television signal in accordance with the standards of the system is applied to the receiver through any necessary matching networks. The vision carrier is modulated with one of the recommended colour bar signals having the chrominance component at 75 percent of maximum amplitude. The receiver controls are adjusted for normal operation and so that standard video output voltage is obtained for an input signal level of −50 dB ( mW ).

Where the receiver uses separate colour difference signal drive to the display tube, the following method is used. An oscilloscope is connected to the electrode of the blue gun to which the colour difference signal is applied. With the receiver adjusted for normal operation and standard input conditions as described above, the level of the colour difference component corresponding to the blue bar is noted as the reference level. The level of the chrominance signal component, including the reference burst, at the coder is then adjusted in steps both above and below the nominal level, the luminance signal component being kept constant. The corresponding levels of the blue bar colour difference component are plotted. An example of such a graph is shown in Fig. 6.

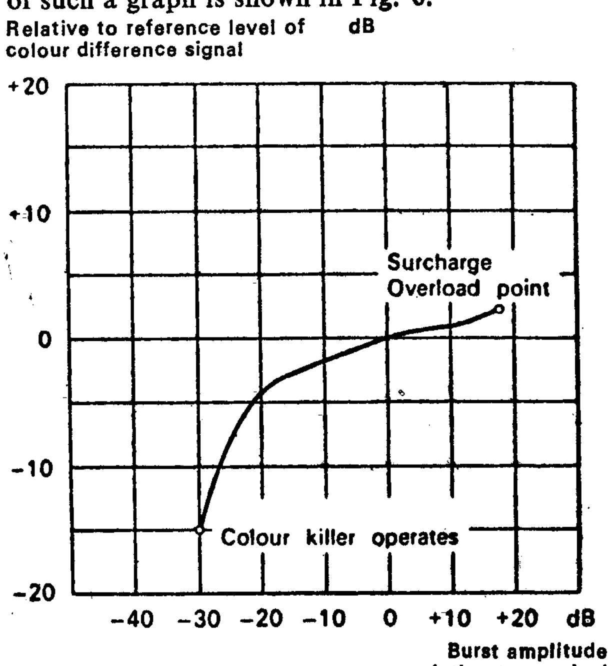



FIG. 6 EXAMPLE OF CHROMINANCE AUTOMATIC GAIN CONTROL CHARACTERISTIC

Where the receiver uses primary colour signal drive to the picture tube, the following method is used. With the receiver set for normal operation as above, an oscilloscope is connected to the picture tube electrode to which the blue primary colour signal is applied. The chrominance signal component is switched off at the coder and the level of the blue bar luminance component remaining is noted as zero chrominance signal level. The chrominance component is then switched on at the coder and the level of the blue bard noted as the reference level. The level of the chrominance signal, including the reference burst, is varied at the coder in steps, the luminance signal remaining constant and the corresponding levels of the bluebar are plotted. An example of such a graph is shown in Fig. 6.

The measurements shall be repeated for some other recommended values of input signal level.

## 12. COMPOSITE LUMINANCE AND CHROMINANCE AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTIC ( NOT APPLICABLE TO MONOCHROME TV RECEIVERS )

**12.1 Definition** — The composite luminance and chrominance automatic gain control dynamic characteristic relates the output level of a primary colour channel of a television receiver to the input level of a colour television signal when that input level is varying cyclically or is subject to a transient change.

This measurement applies to colour systems employing both amplitude and frequency modulation of the chrominance sub-carrier.

**12.2 Method of Measurement** — A television signal in accordance with the standards of the television system is applied to the input terminals of the receiver through an attenuator, the attenuation of which is controllable by a low-frequency signal. Any necessary matching networks are included between the signal generator and the controllable attenuator, and between the controllable attenuator and the receiver.

The relative levels of the vision and sound carriers are adjusted to the ratio specified by the appropriate standards. The picture carrier is modulated with a monochrome test pattern video signal having parts corresponding to 100 percent modulation. The corresponding sound carrier is 30 percent modulated with a suitable audio-frequency tone, for instance 1 kHz.

The sensitivity, contrast and volume controls are so adjusted that standard video output voltage is obtained for a vision input signal level of −50 dB ( mW ) and that the sound output power equals one half of the maximum useful output power.

The monochrome test pattern modulation is removed and the output of the appropriate colour system coder substituted. The input signal to the coder is a 75 percent maximum level red pedestal signal.

A low-frequency sinusoidal controlling signal is applied to the terminals of the controllable attenuator such that the signal level applied to the receiver varies by ±3 dB in power. The frequency of the sinusoid is varied from a very low frequency so that the response time of the automatic gain control circuits does not influence the results, for instance 0·1 kHz, up to a frequency where the control circuitry does not influence the variations of video output voltage. The peak-to-peak variations of the primary colour output voltage excursions, between black level and maximum level corresponding to the variations of input signal level are measured over the defined range of frequencies. If overloading, distortion or cross-modulation occurs at certain frequencies, the effects shall be noted in the results and, if necessary, the range of variation of input signal level reduced, this level being shown in the results.

The measurements shall be repeated with the receiver adjusted in the same way for some other recommended values of the mean input signal level. If the receiver has a local-distant switch or a sensitivity control, measurements shall be made over a range of settings.

The measurements shall be repeated with a low-frequency squarewave controlling the attenuator and the video output voltage excursions between black level and maximum level measured as a function of the time following the squarewave transition. The frequency of the squarewave shall be sufficiently low for the response time of the automatic gain control circuits to be fully displayed.

If at any point anomalous operation of the colour decoder circuits occurs it shall be noted in the results.

**12.3 Graphic Representation** — The results are plotted for sinusoidal variations on graphs showing the relative amplitude of the red primary colour signal on the picture tube electrodes as a function of frequency of variation of the input signal level. An example of such a graph is shown in Fig. 7.

Results for squarewave variation and the input signal level are plotted on graphs showing the relative amplitude of the red primary colour signal at the picture tube electrodes as a function of time following the squarewave transition. An example of such a graph is shown in Fig. 8.

It may be convenient to plot the results of the measurements of the luminance channel of a colour receiver as defined in **10** on the same graph as that showing the overall automatic gain control dynamic characteristic.

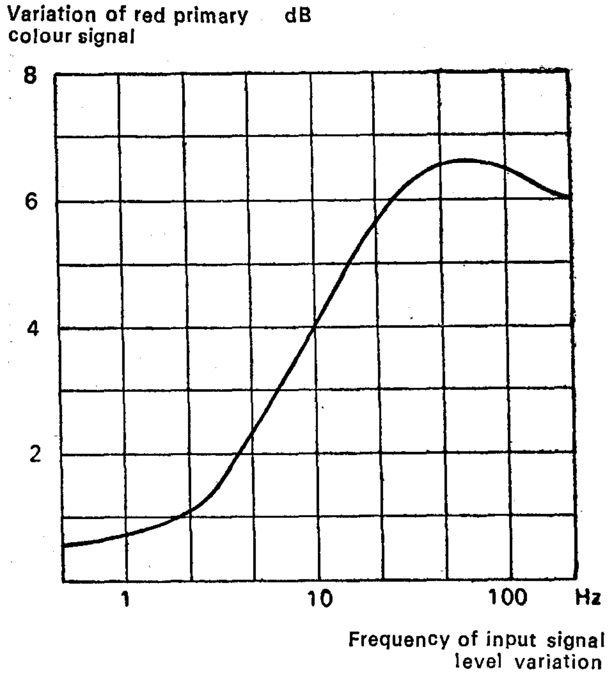



FIG. 7 EXAMPLE OF COMPOSITE LUMINANCE AND CHROMINANCE AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTIC

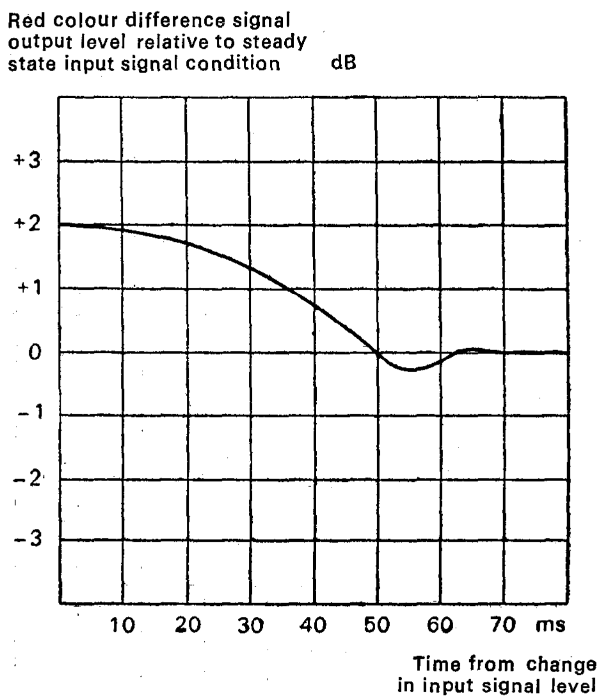



FIG. 8 EXAMPLE OF COMPOSITE LUMINANCE AND CHROMINANCE AUTOMATIC GAIN CONTROL DYNAMIC CHARACTERISTIC TRANSIENT RESPONSE

## 13. COLOUR KILLING ( NOT APPLICABLE TO MONOCHROME TV RECEIVERS )

**13.1 Definition** — The figure of merit of the colour killer circuit defines the level of colour

synchronizing or reference signal at which the chrominance signal decoding circuits are activated or de-activated.

**13.2 Method of Measurement** — A television signal is applied to the input terminals of the receiver at a vision carrier input signal level of −50 dB ( mW ). The vision carrier is modulated with a test pattern video signal. The receiver is adjusted for normal operation, and the level of the chrominance signal, including the reference burst at the coder, is reduced stepwise, the luminance signal remaining constant. The level of chrominance signal at which the colour killer operates is noted.

Starting from substantially zero chrominance level, the chrominance signal, including the reference burst at the coder, is then increased stepwise, the luminance signal remaining constant, and the level noted at which the chrominance decoding circuits become active. These measurements shall be repeated for some other recommended values of input signal level.

## 14. COLOUR KILLER RESPONSE TIME ( NOT APPLICABLE TO MONOCHROME TV RECEIVERS )

**14.1 Definition** — The colour killer response time is the respective time taken for the colour killer to disable and restore operation of the decoding circuits in response to the removal and application of the chrominance signal.

**14.2 Method of Measurement** — A television signal is applied to the input terminals of the receiver at a vision carrier input signal-level of −50 dB ( mW ). A vision carrier is modulated with a test pattern video signal and the receiver adjusted for normal operation.

A double beam long persistence storage type oscilloscope is arranged to display both the video signal applied to the signal generator modulator and one of the primary colour signals or colour difference signals at the terminals of the picture tube.

The chrominance signal, including the reference burst at the colour system coder, is switched off and the time taken for the output from the decoder to decay substantially to zero is noted. This observation may require care since on removal of the chrominance signal including the reference burst, the output from the decoding section of the receiver may consist of noise and/ or spuriously demodulated luminance components and it is the time of effective suppression of these that is to be observed.

The chrominance signal, including the reference burst is now restored on the colour system coder, and the time to achieve substantially normal output from the decoder is measured. The two periods measured are the disabling and enabling response times and are expressed in milliseconds.

## 15. MAXIMUM USABLE SINGLE INPUT SIGNAL LEVEL

**15.1 Definition** — The maximum usable single input signal level is the highest level of input signal for which the receiver can give acceptable performance under conditions as specified in **15.2**.

**15.2 Method of Measurement** — A television signal of convenient level with test pattern modulation is applied to the receiver input terminals. The receiver is tuned and adjusted for optimum results. The input signal level is gradually increased and the receiver sensitivity controls and local-distant switch are adjusted to maintain optimum performance. The highest input signal level for which the performance remain acceptable is then noted.

The measurements shall be repeated in order to find the maximum input signal level which will not cause the receiver to fail to operate normally when manipulating the channel selector ( for example, lock-out by blocking of the AGC ).

The maximum input level which will not cause the receiver to fail to operate normally when switched on with this signal impressed shall also be ascertained.

The lowest value of maximum usable input signal level is recorded together with the conditions and decription of the effect which causes the performance to be unacceptable.

The measurements shall be repeated for a representative number of channels in all of the bands for which the receiver is intended.

## 16. MAXIMUM USABLE MULTIPLE IPNUT SIGNAL LEVEL

**16.1 Definition** — The maximum usuable multiple input signal level is the highest level of input signal on a selected channel for which the receiver can give acceptable performance, under conditions as specified in **16.2**, when accompanied by either or both adjacent channel signals at a level 6 dB higher than that of the selected signal.

**16.2 Method of Measurement** — A television signal of convenient level with test pattern modulation is applied to the receiver input terminals. The receiver is tuned and adjusted for optimum results. The lower adjacent channel signal is then simultaneously applied at a level 6 dB higher than the signal on the selected channel. The level of both signals is gradually increased and the receiver sensitivity controls and local-distant switch are adjusted to maintain optimum performance. The highest input signal level for which the performance remains acceptable is then noted.

The measurements are then repeated first for the upper adjacent channel and then both adjacent channels. The measurements shall also be carried out in order to find the maximum input signal level which will not cause the receiver to fall to operate normally when manipulating the channel selector. The maximum input level which will not cause the receiver to fail to operate normally when switched on with the signals impressed shall also be ascertained.

The adjacent channel signals are also modulated with a test pattern that can be distinguished from the modulation of the signals to which the receiver is tuned.

The lowest value of maximum usable input signal level is recorded together with the conditions and a description of the effect which causes the performance to be unacceptable.

The measurements shall be repeated for a representative number of channels in all bands for which the receiver is intended.

NOTE — Filters shall be included in the signal generators providing the adjacent channel signals in order that signal modulated components in the selected channel are suppressed by a factor of at least 60 dB.

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